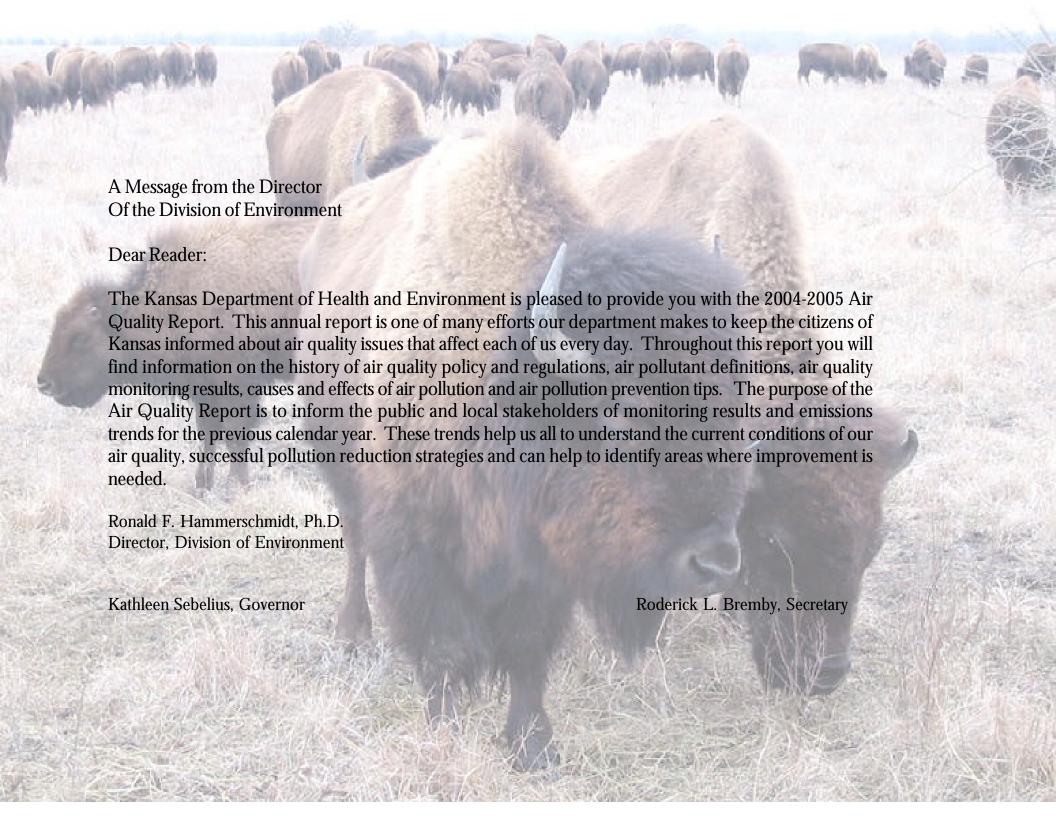
# 2004-2005 Kansas Air Quality Report



Kansas Department of Health & Environment Bureau of Air & Radiation



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## Air Quality Overview

#### **Air Quality History**

What is the Clean Air Act?

The Clean Air Act (CAA) is a federal act originally written in 1970 and is the driving force for all air pollution legislation in the United States. It was written with the primary goal to protect human health and it impacts each of us every day. The CAA serves as a base for a coordinated federal and state regulation system, with the Environmental Protection Agency (EPA) responsible for the Act but with states doing much of the implementation. Under the CAA, all 50 states are responsible for completing and implementing a State Implementation Plan, or SIP. SIPs provide the guidance for a state to achieve standards in the CAA, or if standards are met, how to prevent the air from becoming significantly deteriorated. In 1990, the Clean Air Act was re-written with new terms, amendments and standards intended to ultimately result in improved air quality nationwide.

What are the National Ambient Air Quality Standards?

The National Ambient Air Quality Standards (NAAQS) were established in the original CAA and revised in 1990. NAAQS are standards set for each air pollutant anticipated to endanger public health or welfare. Pollutants in this category, termed criteria pollutants, include: particulate matter, lead, sulfur dioxide, carbon monoxide, ozone, and nitrogen dioxide. The current NAAQS are summarized by pollutant in the table on page 5. As shown in the table, there are two types of air quality standards. The primary standard is designed to protect the public health with an adequate safety margin. Permissible levels of each pollutant were chosen to protect the health of the most susceptible individuals in a population, including children, the elderly, and those with chronic respiratory illnesses. The secondary standard is designed to protect public welfare and ensure quality of life. Air quality conditions described by the secondary standard may be the same as the primary standard and are chosen to limit economic damage as well as harmful effects to buildings, plants, and animals.

During 2004, the Kansas Ambient Air Monitoring Program measured five of the six criteria air pollutants. Monitoring for lead was phased out during 1998, due in large part to the significant drop in measured values caused by the elimination of lead compounds as an additive in gasoline. The following sections will describe each of the five monitored criteria pollutants, their health effects and their sources.

Criteria Air Pollutant	Averaging Time	Primary Standard	Secondary Standard
Carbon Monoxide (CO)	One-hour <sup>a</sup>	35 ppm <sup>b</sup> (40 mg/m <sup>3 c</sup> )	None
	Eight-hour <sup>a</sup>	9 ppm (10 mg/m³)	None
Lead (Pb)	Quarterly Average	1.5 ug/m <sup>3 d</sup>	Same as Primary Standard
Nitrogen Dioxide (NO <sub>2</sub> )	Annual Arithmetic Mean	0.053 ppm (100 ug/m³)	Same as Primary Standard
Ozone (O <sub>3</sub> )	One-hour average <sup>h</sup>	0.12 ppm (235 ug/m³)	Same as Primary Standard
	Eight-hour average <sup>e</sup>	0.08 ppm (157 ug/m³)	Same as Primary Standard
Particulate Matter (PM <sub>10</sub> )	Annual Arithmetic Mean	50 ug/m³	Same as Primary Standard
	24-hour Average <sup>a</sup>	150 ug/m³	Same as Primary Standard
Particulate Matter (PM <sub>2.5</sub> )	Annual Arithmetic Mean <sup>f</sup>	15.0 ug/m³	Same as Primary Standard
	24-hour Average <sup>g</sup>	65 ug/m³	Same as Primary Standard
Sulfur Dioxide (SO <sub>2</sub> )	24-hour <sup>a</sup>	0.14 ppm (365 ug/m³)	None
	Annual Arithmetic Mean	0.03 ppm (80 ug/m <sup>3</sup> )	None
	Three-hour Maximum <sup>a</sup>	None	0.5 ppm (1310 ug/m³)

- a Not to be exceeded more than once a year
- b mg/m³ = milligrams per cubic meter
- c ppm = parts per million
- d ug/m<sup>3</sup> = micrograms per cubic meter
- e Established for a three-year average of the fourth highest daily maximum concentration
- Established for a three-year average
- g Established for a three-year average of the 98th percentile of data
- h (a) The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is <= 1.
  - (b) The 1-hour NAAQS will no longer apply to an area one year after the effective date of the designation of that area for the 8-hour ozone NAAQS. The effective designation date for most areas is June 15, 2004. (40 CFR 50.9; 69 FR 23996)



#### Criteria Pollutants: Definitions and Health Effects

#### Sulfur Dioxide (SO<sub>2</sub>)

What is Sulfur Dioxide and where does it come from? Sulfur Dioxide (SO<sub>2</sub>) is a colorless gas that has a pungent odor at concentrations exceeding 0.5 ppm. Sulfur dioxide belongs to the family of sulfur oxide gases. Sulfur is prevalent in raw materials such as crude oil, coal, and metal ores. Sulfur oxide gases are formed when fuel containing sulfur is burned; when gasoline is

extracted from oil; and, when metals are extracted from ore. The majority of SO<sub>2</sub> released to the air comes from electric utilities, particularly those that burn coal. Other sources that burn high sulfur fuel and release SO<sub>2</sub> to the air include petroleum refineries, cement manufacturing, metal processing facilities, locomotives, large ships, and some off-road diesel equipment. Sulfur dioxide dissolves in water vapor to form

sulfuric acid, and interacts with other gases and particles in the air to form sulfates and other products that can be harmful to people and their environment.

What are the health effects of sulfur dioxide? Sulfur Dioxide contributes to respiratory illness, particularly in children and the elderly, and aggravates existing heart and lung diseases.  $SO_2$  particularly affects people with asthma. It also contributes to the formation of acid rain, which damages trees, crops, historic buildings, and monuments, and makes soils, lakes, and streams acidic. Sulfur dioxide and sulfate particles can be transported over long distances and deposited far from the point of origin. This means that problems with  $SO_2$  are not confined to areas where it is emitted. It also contributes to the formation of atmospheric particles that cause visibility impairment.

#### Carbon Monoxide (CO)

What is Carbon Monoxide and where does it come from?

Carbon Monoxide (CO) is a colorless, odorless gas that is formed when carbon in fuel is not burned completely. It is a component of motor vehicle exhaust, which contributes about 56 percent of all CO emissions nationwide. Higher levels of CO generally occur in areas with heavy traffic congestion. Other sources of CO emissions

include industrial processes (such as metals processing and chemical manufacturing), residential wood burning, and natural sources such as forest fires. The highest levels of CO in outside air typically occur during the colder months of the year when inversion conditions are more frequent. This means the pollution becomes trapped near the ground beneath a layer of warm air.



What are the health effects of carbon monoxide?

Carbon monoxide can cause harmful health effects by reducing oxygen delivery to the body's organs and tissues. The health threat from lower levels of CO is most serious for those who suffer from heart disease such as angina, clogged arteries, or congestive heart failure. For such a person, a single exposure to CO at low levels may cause chest pain and reduce that person's ability to exercise; repeated exposures may contribute to other cardiovascular effects. Higher levels of CO can affect even healthy people. People who breathe high levels of CO can develop vision problems, suffer reduced manual dexterity, and experience difficulty performing complex tasks. CO also contributes to the formation of smog, which can trigger serious respiratory problems.

#### Nitrogen Oxides (NO<sub>x</sub>)

What are Nitrogen Oxides and where do they come from? Nitrogen Oxides ( $NO_x$ ), is the generic term for a group of highly reactive gases, all of which contain nitrogen and oxygen in varying amounts. Many of the nitrogen oxides are colorless and odorless. However, one common pollutant, nitrogen dioxide ( $NO_2$ ), along with particles in the air can often be seen as a yellowish-brown layer over many urban areas. Nitrogen oxides form when fuel is burned at high temperatures, as in a combustion process. The primary sources of  $NO_x$  are motor vehicles, boilers, furnaces, and other industrial, commercial, and residential sources that burn fuels.

 $NO_x$  is one of the main ingredients involved in the formation of ground-level ozone, which can trigger serious respiratory problems. Most  $NO_x$  is emitted to the atmosphere as nitric oxide

(NO), which in the presence of hydrocarbons is then converted to nitrogen dioxide (NO $_2$ ). The NO $_2$  created by this reaction is then available to participate in the reaction that forms ozone. Nitrogen oxides also react to form nitrate particles and acid aerosols, which cause respiratory problems. NO $_{\rm x}$  and the pollutants formed from NO $_{\rm x}$  can be transported over long distances, following the pattern of prevailing winds in the U.S. This means that problems associated with NO $_{\rm x}$  are not confined to areas where it is emitted. NO $_{\rm x}$  is most effectively controlled by a regional perspective or plan, rather than focusing on sources in one local area.

What are the health effects of nitrogen oxides? NO<sub>x</sub> and sulfur dioxide react with other substances in the air to form acids, which fall to earth as rain, fog, snow or dry particles. Acid rain causes deterioration of car finishes, buildings and historical monuments, and causes lakes and streams to become acidic and unsuitable for many species of fish. NO<sub>x</sub> reactions can also cause the formation of small particles that penetrate deeply into sensitive parts of the lungs and can cause or worsen respiratory disease such as emphysema and bronchitis, and aggravate existing heart disease. Nitrate particles and nitrogen dioxide can block the transmission of light, reducing visibility in urban areas, and on a regional scale, in our national parks and wilderness areas.



#### Ozone (O<sub>3</sub>)

What is Ozone and how is it formed?

Ozone (O<sub>2</sub>) is a gaseous compound composed of three oxygen atoms. It is created by a chemical reaction between nitrogen dioxide and volatile organic compounds (VOCs) in the presence of certain meteorological conditions. Such conditions include sufficient heat, solar radiation and little or no wind to drive the photochemical reaction. Ozone has the same chemical structure whether it occurs miles above the earth or at ground level. "Good" ozone, generally known as the Ozone Layer, occurs naturally in the stratosphere approximately 10 to 30 miles above the earth's surface. This layer protects life on earth from the sun's harmful ultraviolet rays. In the earth's lower atmosphere, groundlevel ozone causes health and environmental problems and is considered "bad."

Motor vehicle exhaust, industrial emissions. gasoline vapors, and chemical solvents are some of the major sources of NOx and VOC emissions that help to form ozone. Peak ozone levels typically occur during hot, stagnant summertime conditions. Large urban areas tend to have the highest ozone levels due to the increased number of sources. Rural areas can experience increased ozone levels when wind carries ozone and pollutants that form it hundreds of miles from their original sources.

What are the health effects of ozone?

Even at low levels, ground-level ozone triggers a variety of health problems including asthma attacks, reduced lung capacity, and increased susceptibility to respiratory illnesses like pneumonia and bronchitis. Ozone can irritate lung airways and cause inflammation, and after long-term exposure, can cause permanent lung damage. Other symptoms include wheezing, coughing, pain when taking a deep breathe, and breathing difficulties during exercise or outdoor activities. People with respiratory problems are most vulnerable to elevated ozone levels. Ground-level ozone also damages the leaves of trees and other plants, ruining the appearance of cities, national parks, and recreation areas. Ozone reduces crop and forest yields and increases plant vulnerability to disease, pests, and harsh weather.

#### Particulate Matter (PM)



What is Particulate Matter and where does it come from?

Particulate matter (PM) is a broad classification of non-gaseous pollutants that consists of very fine solid particles and liquid droplets, or aerosols. Examples of these solid particles can include dust, dirt, soot, and particles in smoke. Some particles are directly emitted into the air from sources such as vehicles,

factories, construction sites, tilled fields, unpaved roads, stone crushing, and burning of wood. Other particles may be formed in the air when gases from burning fuels react with sunlight and water vapor such as fuel combustion in motor vehicles or at power plants. Particles can be suspended in the air for long periods of time and vary in size. Some particles are large or dark enough to be seen as soot or smoke. Others are so small that they can only be detected with an electron microscope.

What are the health effects of Particulate Matter?

Particulate Matter causes a wide variety of health and environmental impacts. Examples of serious health effects include: aggravated asthma; coughing and breathing difficulty; chronic bronchitis; decreased lung function and premature death. Elevated PM concentrations result in increased hospital admissions and emergency room visits for people with heart and lung disease. Health problems for sensitive people can get worse if they are exposed to high levels of PM for several days in a row.

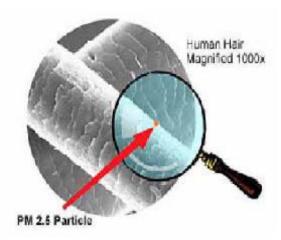
## PM<sub>10</sub>

Particulate matter with an aerodynamic diameter of less than or equal to 10 microns is designated as  $PM_{10}$ . Burning of wood, diesel and other fuels, and open burning contribute particulate matter to the atmosphere, generally in the form of smoke. In addition, dust from agricultural operations, unpaved roads, and dust storms contains a significant proportion of  $PM_{10}$ . Some areas within the state of Kansas experience occasional severe episodes of blowing dust or dust storms. Inhalation of  $PM_{10}$  can cause irritation of the nose and throat, bronchitis, and damage to lung tissue. Children, elderly persons, and individuals with impaired

lung or heart function are especially susceptible to the adverse health effects associated with inhalation of airborne particulate matter.

## $PM_{2.5}$

In 1997, EPA added a new particulate matter standard for particles with an aerodynamic diameter of less than or equal to 2.5 microns (PM<sub>2.5</sub>). This change was



based on concerns that smaller particles travel deep into the lungs and cause or aggravate respiratory problems such as asthma and chronic bronchitis. Children, the elderly, and people with lung or heart disease are considered to be especially susceptible to the adverse health effects of airborne fine particulate matter.

Fine particles ( $PM_{2.5}$ ) result from fuel combustion in motor vehicles, power generation, and industrial facilities, as well as from residential fireplaces and wood stoves. Research has shown that gases such as sulfur oxide and  $SO_2$ ,  $NO_X$ , and VOCs interact with other compounds in the air to form fine particles.



## Air Quality Monitoring

#### The Kansas Ambient Air Monitoring Network

#### What does the Kansas Air Monitoring Network do?

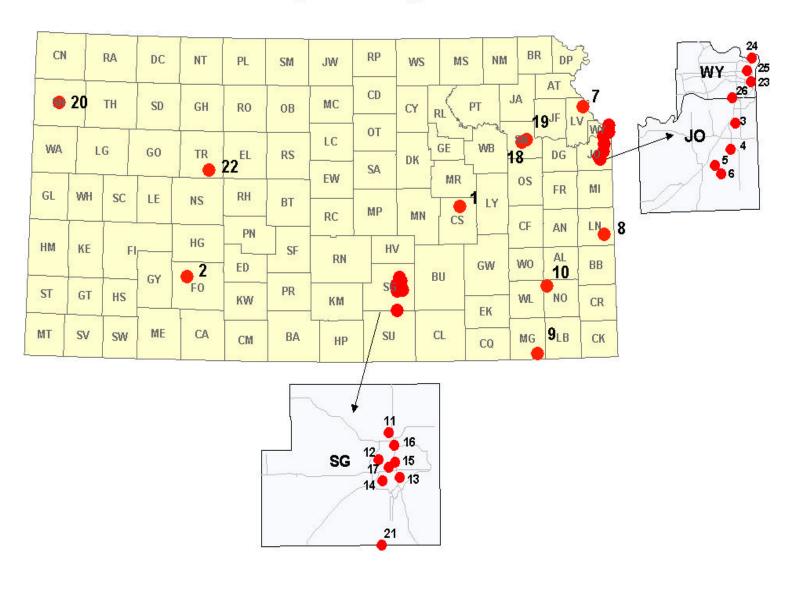
The Kansas air monitoring network collects air quality data in order to:

- Evaluate whether Kansas citizens are exposed to air pollutants in concentrations above the federal ambient air quality standards. These standards have been established to protect public health and to provide secondary benefits such as preservation of the environment, structures, crops and scenic vistas at national parks.
- Determine regional and national air pollution trends.
- ♦ Determine federal air quality standard attainment or non-attainment status. Data generated by the Kansas monitoring network is reported on a quarterly basis to the Air Quality System (AQS), a national database maintained by EPA.
- ♦ Educate and inform the public through reports such as this, presentations, and the agency website. Ozone data is posted to the Bureau of Air and Radiation web site to inform the public about air quality on a real-time basis. This allows persons to make decisions to reduce exposure to air pollution by staying indoors or reducing physical activity. They can also make life style choices such as riding the bus or avoiding unnecessary trips to reduce emissions of air pollutants.
- ◆ Support other program activities. The data collected is used to determine whether air quality models are working properly by comparing modeled results against monitored results.
- ♦ For these and many other reasons, a quality air monitoring network is an important part of the overall air program.

#### Who operates the monitors?

The Kansas air quality network is operated by many different parties. Three local county agencies, Wyandotte, Shawnee and Sedgwick, participate in monitoring activities. The Kansas Department of Wildlife and Parks assists in the operation of the IMPROVE-protocol monitor at Cedar Bluff. Private citizens collect samples at particulate matter monitors in several locations. Finally, BAR staff operate many of the monitors and provide quality assurance audits at all monitors in the network.

## **Air Quality Monitoring Sites in Kansas**



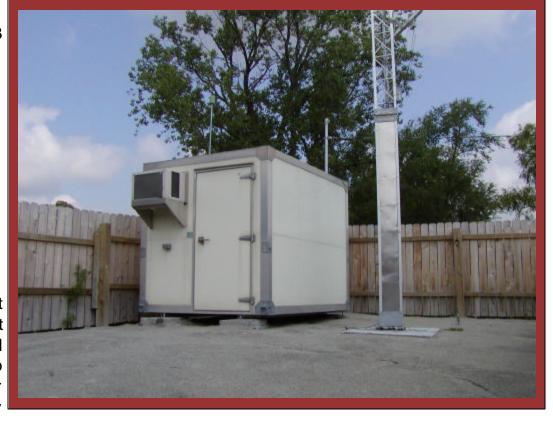


#### What does the network monitor for?

For 2004, the Kansas Ambient Air Monitoring Network consisted of 25 sampling sites at which the following criteria pollutants were measured:

- ☐ Fine particulate matter (PM<sub>2.5</sub>) at 13 sites
- PM<sub>10</sub> at 12 sites
- Ozone (O<sub>3</sub>) at 9 sites
- ☐ Meteorological data at 7 sites
- □ Sulfur dioxide (SO₂) at 5 sites
- ☐ Carbon monoxide (CO) at 4 sites
- □ Nitrogen dioxide (NO₂) at 4 sites
- ☐ Fine particle speciation at 2 sites
- ☐ Hydrogen sulfide (H<sub>2</sub>S) at 1 site
- ☐ Total Suspended Particulate at 1 site
- ☐ IMPROVE-protocol at 2 sites

The type and location of the monitors that comprise the network are a result of our effort to serve the many uses for the data described previously. A monitor may be located to evaluate air quality near a specific facility or other potential source of air pollution, or it may

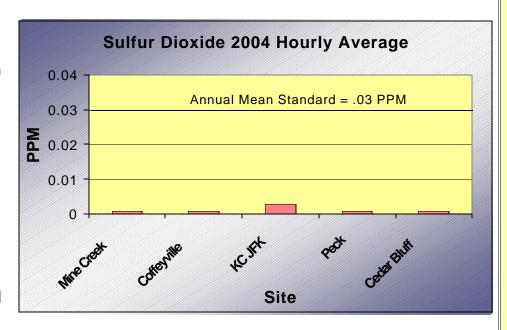


serve a broader purpose. The majority of monitors are located in metropolitan areas to collect data representative of exposure of large populations to air pollutants. The ozone and  $PM_{2.5}$  monitors are examples of such monitoring locations. Our network also includes two monitoring locations designed to evaluate the impacts of long range transport of air pollutants into and through Kansas. The monitoring sites at Peck and Mine Creek serve this purpose. They also provide valuable background data for Wichita and Kansas City respectively. The monitoring site at Cedar Bluff is located in an area relatively free of air pollutants caused by industry or transportation sources and therefore serves as a baseline or background site for the entire state.

#### **Air Quality Monitoring Results**

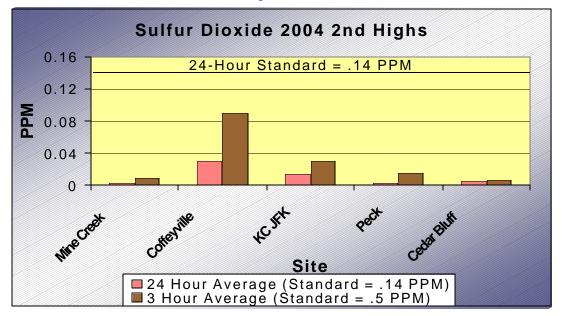
#### Monitoring Results: Sulfur Dioxide (SO<sub>2</sub>)

The primary air quality standard for  $SO_2$  is expressed in three forms: an hourly average value; a 3-hour value not to be exceeded more than once per year; and a 24-hour value not to be exceeded more than once per year. Graph number 1 shows the hourly average value concentrations for five sites where  $SO_2$  was monitored in Kansas during 2004; Mine Creek (Linn County), Coffeyville (Montgomery County), KC JFK (Wyandotte County), Peck (Sumner County) and Cedar Bluff (Trego County). The annual mean monitoring results for all five sites were well below the hourly standards for  $SO_2$ . The Kansas City JFK site showed the highest concentration for the hourly average standard due to the proximity of the site to industrial sources of  $SO_2$ .



Graph 1

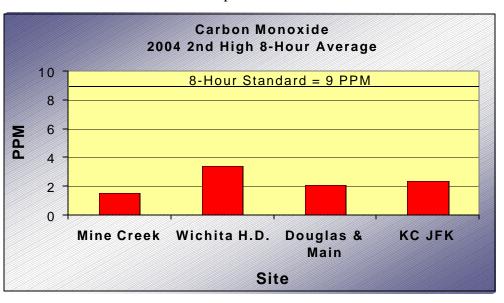
Graph 2



Graph 2 displays 2004 monitoring results showing the 2nd highest average for both the 24-hour standard and the 3-hour standard. Monitoring results from the Coffeyville site showed the highest concentration for both standards. The 2nd highest average for the 3-hour standard was about .09 Parts Per Million (ppm) and the 2nd highest average for the 24-hour average standard was about .03 ppm.



Graph 3



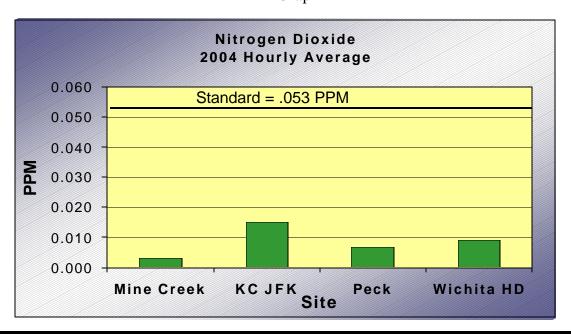
#### Monitoring Results: Carbon Monoxide (CO)

The primary air quality standard for CO is expressed in two forms: an 8-hour average value; and a 1-hour average value. Both are not to be exceeded more than once per year. Graph number 3 shows the 2nd highest 8-hour average concentrations for the four sites where CO was monitored in Kansas during 2004. The four CO monitoring sites are Mine Creek (Linn County), Wichita Health Department (Sedgwick County), Douglas and Main (Sedgwick County), and KC JFK (Wyandotte County). All of the sites were well below the 8-hour standard.

#### Monitoring Results: Nitrogen Oxides (NO<sub>x</sub>)

The primary air quality standard for NO<sub>2</sub> is expressed in the form of an annual arithmetic mean. Graph number 4 shows the NO<sub>2</sub> monitoring results for the four sites. These sites include Mine Creek (Linn County), KC JFK (Wyandotte County), Peck (Sumner County) and Wichita H.D. (Sedgwick County). All sites were well below the primary air quality standard of 0.053 ppm. The annual average concentration recorded at the KC JFK site was the highest due to its location in a metropolitan area, where commercial, industrial and motor vehicle emissions are more prevalent.

Graph 4



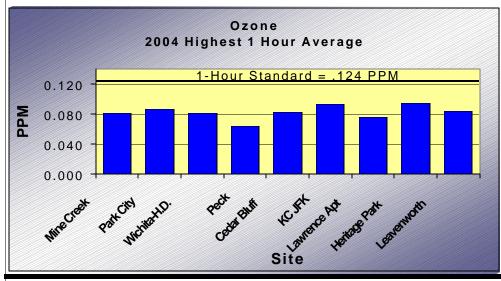
#### Monitoring Results: Ozone (O<sub>3</sub>)

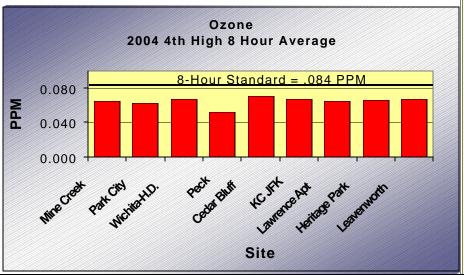
The primary air quality standards for ozone are for concentrations averaged over 8-hour or 1-hour durations. The 8-hour standard is expressed in the form of the three-year average of each year's 4th highest concentration. The 8-hour standard is 0.08 ppm. The standard allows for upward rounding of the results. The standard is not exceeded until monitored values exceed 0.084 ppm. The 1-hour standard is not to be exceeded more than once per year on average over three years. The 1-hour standard is 0.12 ppm. The 1-hour standard also allows for upward rounding. The standard is not exceeded until monitored values exceed 0.124 ppm.

When evaluating ozone monitoring results, it is important to remember two points. First, the rounding allowed by the standard means that a value can be slightly above the standard and not be considered a violation. Second, ozone values higher than the standard for one year do not always indicate a violation of the air quality standard. These determinations are made on the basis of three years of data.

Graph number 5 shows the highest 1-hour concentrations for the nine sites where ozone was monitored in Kansas during 2004. All of the monitoring sites had 1-hour results that were well below the standard. Graph number 6 shows the 4th highest 8-hour average concentrations for the same nine sites. The 8-hour results show that a few of the monitors are fairly close to the standard.



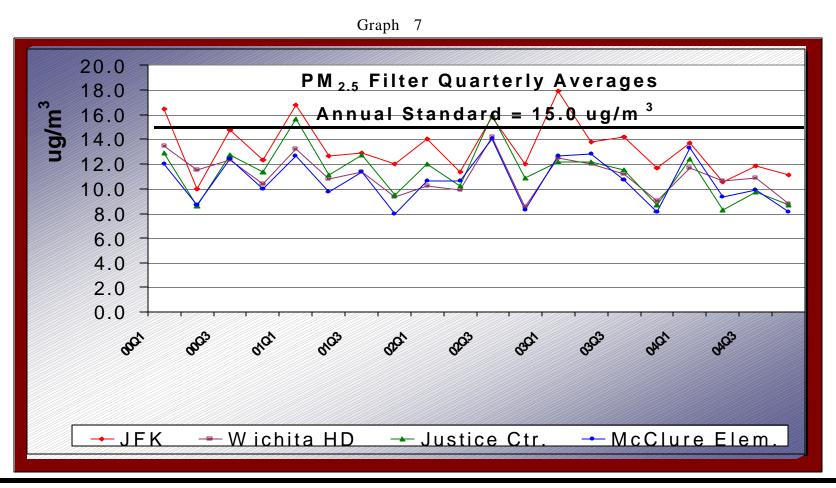






#### Monitoring Results: Fine Particulate Matter (PM<sub>2.5</sub>)

The PM<sub>2.5</sub> standards issued by EPA in 1997 were set for two time periods, an annual average and a 24-hour average. The annual average standard was set at 15.0 micrograms per cubic meter (ug/m<sup>3)</sup>, while the 24-hour average standard was set at 65 ug/m<sup>3</sup>. The PM<sub>2,5</sub> monitoring sites across the state have completed 3 years of data gathering. This 3 year period began in January of 1999. All sites across the state have remained within the PM<sub>2.5</sub> standards over this 3 year period. Graph 7 lists the quarterly values of PM<sub>2.5</sub> that were recorded across the state from 2000 to 2004. The monitoring sites are JFK (Wyandotte County), Wichita HD (Sedgwick County), Justice Center (Johnson County) and McClure Elementary (Shawnee County).



#### Causes and Effects of Air Pollution

#### **Causes of Air Pollution in Kansas**

Where does air pollution come from in Kansas? Sources of air pollution are divided up into four categories; Point Sources, Area Sources, On-road Mobile Sources and Non-road Mobile Sources. Point **sources** are large, stationary sources of emissions. Examples of point sources are natural gas compressor stations, petroleum refineries and grain processing or storage facilities. Area sources are smaller, generally more numerous sources whose individual emissions do not qualify them as point sources. Although area sources release relatively small amounts of air pollutants on an individual basis, because of the numbers of these sources, their emissions as a whole are significant. Examples include household solvents and paints, motor vehicle refueling and residential fuel combustion. Onroad Mobile sources are sources of air pollution that are not stationary, and can typically be driven on a

22%

11%

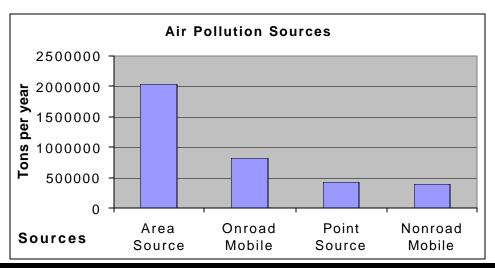
55%

Point Source Area Source
Nonroad Mobile Onroad Mobile

highway such as cars, trucks, buses and motorcycles. **Non-road Mobile Sources** are also not stationary, but typically are not driven on highways. Example of Non-road Mobile Sources include lawnmowers, locomotives and tractors.

When people think of air pollution sources they typically think of industry as a large source of air pollution. While industry does contribute pollutants, in Kansas it is estimated that only about 12% of the total pollutants emitted is from industry sources. As you can see by the pie chart, the majority of air pollution in Kansas comes from Area Sources, or about 55%.

The chart below shows the estimated amount of tons of pollutants emitted each year by all air pollution sources. As can be seen in the chart, Area Sources contribute over an estimated 2 million tons per year. That's over 4 times the amount estimated from Point Sources, which is less than 500 thousand tons a year.







#### Graph 8

#### **Emissions Inventory**

An emissions inventory is a summary of air pollutant emissions covering a geographic area for a specific time period. Emissions inventories have multiple uses on both the federal and state levels. The Bureau of Air and Radiation uses emissions inventory information in the following ways:

- \* To determine trends in air pollutant emissions levels.
- \* To provide inputs to air quality modeling,
- \* To design air pollution control policies and assess their effectiveness after implementation,
- \* To site ambient air monitors, and
- \* To determine emissions fees.

## 2003 Kansas Point Source Emissions by **Source Category** Oil And Gas Extraction ■ Nox ■ SOx ■ CO ■ PM10 ■ VOC Stone, Clay, Glass And **Concrete Products** Petroleum Refining And Related Industries Natural Gas Compressor **Stations Chemicals And Allied Products Electric Utilities Tons**

#### **Point Source Emissions Inventory**

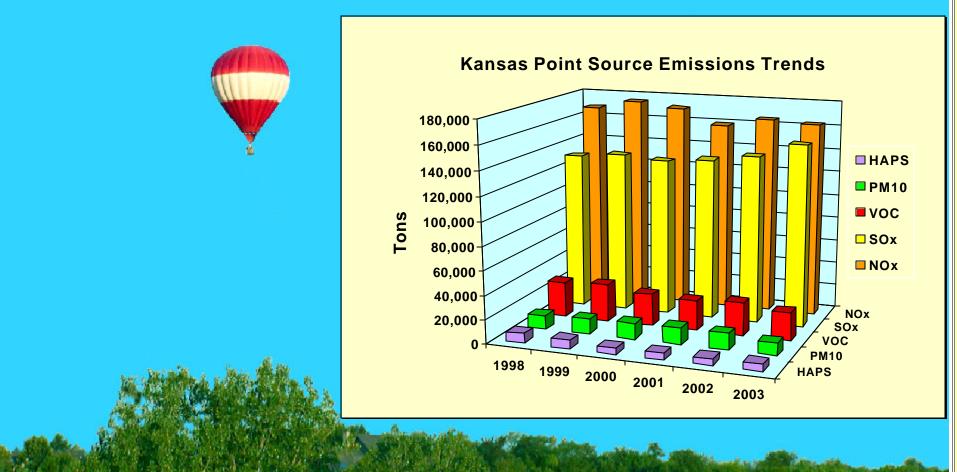
Every year the Bureau of Air and Radiation prepares an emissions inventory of SO<sub>2</sub>, CO, NO<sub>3</sub>, VOC, PM<sub>10</sub> and hazardous air pollutants (HAPS) from point sources in Kansas. The Bureau mails survey forms to facilities with Class I and Class Il permits requesting information regarding operating rates and the quantities and types of air pollutants emitted during the preceding calendar year. After the facilities complete the forms and submit them to the Bureau, the information is reviewed for quality assurance purposes, entered into a large database and forwarded to the Environmental Protection Agency (EPA).

The Bureau has completed the Kansas point source emissions inventory for calendar year 2004. Graph 8 utilizes Point Source emissions data only. It shows which point sources in Kansas are emitting the highest amounts of pollutants.

Graph 9 below, illustrates the total reported emissions in tons from 1995 through 2003.  $NO_x$  is the highest emitted pollutant when all total emission sources are calculated.  $SO_x$  emissions are second in tons emitted per year, and have been gradually increasing the more recent years. Additional summaries of Kansas point source emissions may be found on the Bureau's emissions inventory website at http://www.kdhe.state.ks.us/bar/emission/index.html.



Graph 9





#### **Effects of Air Pollution**

What are the health effects of poor air quality?

As mentioned in previous sections, there are many adverse health effects from air pollution and poor air quality. Both symptoms and the severity of the effect can vary greatly from person to person. Some health effects of poor air quality include difficulty breathing, chest pains, coughing, and headaches. People with asthma, bronchitis, emphysema or other upper respiratory illness are often more susceptible to adverse health effects caused by poor air quality. Determining the quality of the air on a daily basis is difficult for the average person. To help the public understand the quality of the air the Environmental Protection Agency created the Air Quality Index (AQI).

#### **Air Quality Index**

How do I know the quality of the air?

Similar to the weather in Kansas, the quality of the air can change from day to day. In order to help citizens understand the quality of the air on a day to day basis, the Environmental Protection Agency (EPA) has created an Air Quality Index (AQI). The AQI is a number and color coded chart or index to help us understand the quality of the air that day and the associated health risks. The AQI works similar to a ruler, and the measuring limits are from 0 - 500. The lower the number assigned that day, the better the quality of the air and the less health risk, while the higher the number assigned, the worse the quality of the air and the greater the health risk. The AQI provides information on 5 major air pollutants; Groundlevel Ozone, Particulate Matter, Sulfur Dioxide, Nitrogen Oxide and Carbon Monoxide. To understand the quality of the air, the AQI is divided into six categories and associated with each category are varying health risks.



Air Quality Index (AQI) Values	Levels of Health Concern	Colors
When the AQI is in this range:	air quality conditions are:	as symbolized by this color:
0 to 50	Good	Green
51 to 100	Moderate	Yellow
101 to 150	Unhealthy for Sensitive Groups	Orange
151 to 200	Unhealthy	Red
201 to 300	Very Unhealthy	Purple
301 to 500	Hazardous	Maroon

"Good" The AQI value for your community is between 0 and 50. Air quality is considered satisfactory, and air pollution poses little or no risk.

"Moderate" The AQI for your community is between 51 and 100. Air quality is acceptable; however, for some pollutants there may be a moderate health concern for a very small number of people. For example, people who are unusually sensitive to ozone may experience respiratory symptoms.

"Unhealthy for Sensitive Groups" When AQI values are between 101 and 150, members of sensitive groups may experience health effects. This means they are likely to be affected at lower levels than the general public. For example,

people with lung disease are at greater risk from exposure to ozone, while people with either lung disease or heart disease are at greater risk from exposure to particle pollution. The general public is not likely to be affected when the AQI is in this range.

"Unhealthy" Everyone may begin to experience health effects when AQI values are between 151 and 200. Members of sensitive groups may experience more serious health effects.

"Very Unhealthy" AQI values between 201 and 300 trigger a health alert, meaning everyone may experience more serious health effects.

"Hazardous" AQI values over 300 trigger health warnings of emergency conditions. The entire population is more likely to be affected.

June 14, 2005 2:00 pm EDT

To find out the AQI on a day to day basis in Kansas please visit www.airnow.gov

\*The map above represents the quality of the air on June 14, 2005. The majority of the United States air quality is 'Good', with a few 'moderate' areas in California, New Mexico, Rhode Island and Alabama.



## **Program Update**

#### The Clean Air Mercury Rule

On March 15, 2005 the Environmental Protection Agency (EPA) issued the first ever federal rule targeted at reducing mercury emissions from coal-fired power plants. This makes the United States (US) the first country in the world to administer such a rule. The rule is called the Clean Air Mercury Rule. Coal-fired power plants are the largest anthropogenic powered source of mercury emissions in the US. Mercury is found in coal and is emitted from power plants when the coal is burned. Very little mercury is actually found in the air. Atmospheric mercury is transported to soil and water through rain, snow or other similar atmospheric conditions and can contaminate water bodies such as lakes, rivers and streams. Once in our water bodies, the mercury is transformed into methylmercury and can build in fish tissue and we are then exposed by eating the contaminated fish. The new federal mercury rule, when fully implemented, will reduce power plant emissions by 70%, or from 48 tons a year to 15 tons a year. For more information about mercury and the EPA's Clean Air Mercury rule visit <a href="https://www.epa.gov/mercury">www.epa.gov/mercury</a>. For more information on Kansas fish advisories please visit <a href="https://www.kdhe.state.ks.us/news/web\_archives/2005/01072005.html">www.kdhe.state.ks.us/news/web\_archives/2005/01072005.html</a>

#### New National Monitoring Network Design

The Environmental Protection Agency (EPA) has developed a new National Ambient Air Monitoring Strategy (NAAMS). The goal of the new strategy is "to improve the scientific and technical competency of existing air monitoring networks to be more responsive to the public, and the scientific and health communities...." (National Ambient Air Monitoring Strategy Document). As part of the strategy, a new monitoring network design has been proposed called the *National Core Network (NCore)*. NCore will serve the overall NAMS goals, as well as, determine air quality trends, report to the public, assess emission reduction strategy effectiveness, provide data for health assessments and help determine attainment / non-attainment status. The Kansas ambient air monitoring program has accomplished most of the required network reconfigurations, and is working with the US EPA to complete this effort.

#### New Lawn and Garden Outreach Program

The Kansas Department of Health and Environment has begun planning a new Lawn and Garden Outreach program. The new program will target 4 audiences, the general public, lawn and garden equipment retailers and manufacturers, the professional lawncare industry and large landscape customers such as government offices and private entities. The purpose of the program is to reduce air pollution from lawn and garden equipment and build awareness about this issue. Gasoline-powered lawn mowers and lawn equipment contribute thousands of tons of polluting chemicals each year into the atmosphere. Many of these chemicals, such as NOx and VOCs, contribute to the formation of ground-level ozone. According to the 2002 National Emissions Inventory (NEI), Nonroad Mobile source emissions account for 400,000 tons of pollutants each



Kansas Nonroad Mobile Source Emissions (2002 NEI)

35,000
25,000
15,000
10,000
5,000
1, land Content Light Processional Equity. Market Content Content

year in Kansas. Lawn and garden equipment are part of the Nonroad mobile source emissions category. The chart below compares lawn and garden equipment to other sources in the Nonroad mobile source emissions category. The chart shows that lawn and garden sources are the highest emitting sources of VOCs, and the fifth highest emitting source of NOx.



## About the Bureau

#### Bureau of Air and Radiation Mission:

To protect the public and the environment from radiation and air pollution.

#### Bureau of Air and Radiation Goals:

- 1.) To conserve Air Quality
- 2.) To control Air Pollution
- 3.) To protect the Public Health and Safety from Radiation





4.) To provide Quality Service to Customers

## Air Construction/Operating Permits and Compliance Section (ACOPCS)

The ACOPCS section is responsible for reviewing construction and operating permit applications, determining compliance, and if needed, enforcing actions due to noncompliance. To ensure that they minimize the release of air contaminants and meet all regulatory requirements, facilities must apply for a construction permit. Construction permits may be required for new construction, reconstruction or adding on to an existing facility. The Section also processes operating permit applications.

Staff determines which air quality regulations apply to the facility applying and then incorporate all the provisions into one operating permit. The Unified Government Health Department assists in the permitting process by issuing construction and operating permits in Wyandotte County. The ACOPCS staff uses a combination of information and education, technical

assistance and enforcement actions to ensure facilities comply with applicable requirements. Staff from KDHE's district offices, as well as the four cooperating local agencies, conduct inspections and forward the results to the compliance staff for review and response. When a source violates an air quality standard, ACOPCS staff takes formal enforcement action and works with the facility to return them to regulatory compliance.

#### Monitoring and Planning Section

The Air Monitoring and Planning Section administers the air monitoring and modeling program and the emissions inventory program. In cooperation with three local agencies, section staff operate an air monitoring network, which provides air quality



data from 25 sites around the state. The monitoring data is analyzed to determine compliance with federal standards and to evaluate air quality trends. Staff members also conduct an annual emissions inventory of pollutants emitted from permitted facilities and other sources for the entire state. Staff who conduct air quality modeling use the emission inventory data. Modeling helps to better understand the causes of air pollution and to develop pollution reduction strategies in targeted areas. Such pollution reduction strategies are incorporated into state and regional plans to protect the public health, welfare and environment from the negative effects of air pollution.





#### Radiation and Asbestos Control Section

The Radiation and Asbestos Control Section protects the public and the environment from the harmful effects of manmade radiation, natural radiation and asbestos. This includes administering the environmental radiation surveillance program, the radioactive materials and X-Ray control programs, the asbestos program and the Right-to-Know program. The environmental radiation surveillance program detects, identifies, and measures any radioactive material released to the environment by the Wolf Creek Generating Station. The radioactive materials and X-Ray control programs regulate the use of ionizing radiation in Kansas. The asbestos program monitors the removal of asbestos from building renovations and demolition projects. This program also issues licenses to asbestos workers to ensure trained personnel conduct appropriate removal activities. Finally, the Right-to-Know program receives information regarding chemical storage and releases and makes such information available to the public.



## Additional Information )

United States Environmental Protection Agency Region 7 901 North 5<sup>th</sup> Street Kansas City, Kansas 66101 www.epa.gov/region7

Johnson County Environmental Department Pollution Control Division Southlake Tech. Center Building #4 11180 Thompson Avenue Lenexa, Kansas 66219 www.sharetheair.com

Mid-America Regional Council (MARC) 600 Broadway, 300 Rivergate Center Kansas City, MO 64105 www.marc.org

Shawnee County Health Agency 1615 West 8th Street Topeka, Kansas 66606 www.co.shawnee.ks.us

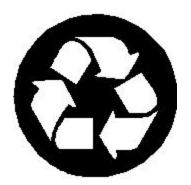
Unified Govt. of Wyandotte County-KC, Kansas Department of Air Quality 619 Ann Kansas City, Kansas 66101 www.wycokck.org City of Wichita Environmental Services
1900 East 9th Street
Wichita, Kansas 67214
http://www.wichita.gov/CityOffices/Environmental/AirQuality/

Kansas Dept. of Health and Environment Division of Environment Bureau of Air and Radiation 1000 SW Jackson, Suite 310 Topeka, Kansas 66612-1366 www.kdhe.state.ks.us/bar

#### **KDHE-Bureau of Air and Radiation Contacts:**

Administration: Clark Duffy, Director	785-296-6024
Asbestos/Right to Know:	785-296-1689
Compliance:	785-296-1544
Construction Permits:	785-296-1583
Emissions Inventory:	785-296-0451
Modeling:	785-296-6429
Monitoring Data:	785-296-1575
Monitoring:	785-291-3272
Operating Permits:	785-296-1561
Radiation:	785-296-1565

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